Spot Safety Project Evaluation

Project Log # 200408075

Spot Safety Project # 05-94-065

Spot Safety Project Evaluation, of the Traffic Signal Installation, at the Intersection of US 70B/ NC 98/ Holloway Street and Elizabeth Street in Durham, Durham County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 04/11/2005
Carrie L. Goodrich Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-94-065– The Intersection of US 70B/ NC 98/ Holloway Street and Elizabeth Street in Durham, Durham County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis has been completed to measure the effectiveness of the spot safety improvement. Additional analysis methods were not utilized for this evaluation because a suitable comparison group was unattainable. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a two-phase traffic signal. J.T. Gould, Division 5 Traffic Engineer, originally requested the improvements. Prior to the spot safety project, Elizabeth Street was a three-lane facility at the intersection with US 70B/ NC 98/ Holloway Street. Currently, Elizabeth Street is a five-lane facility at the treatment intersection, with a left-turn lane, thru lane, and thru and right-turn lane on both approaches. US 70B/ NC 98/ Holloway Street is a two-lane facility (currently and prior to the signal installation). Both roads have a speed limit of 35 mph.

The improvement was chosen to help alleviate the number of Angle crashes at the subject intersection. The initial crash analysis for this location was completed from September 1, 1990 through September 30, 1993 with a total of 17 Angle crashes. The final completion date for the improvement at the subject intersection was on January 27, 1997.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 1996 through March 31, 1997. The before period consisted of reported crashes from April 1, 1990 through November 30, 1996 (6 Years, 8 Months) and the after period consisted of reported crashes from April 1, 1997 through November 30, 2003 (6 Years, 8 Months). The treatment data consisted of all crashes within 150 feet of the subject intersection. Please see attached *Location Map* for further detail.

The attached data Table 1 depicts the Naive Before and After Analysis for the above information. The data in Tables 1 consists of an overall crash summary and a crash type summary for the treatment intersection. The overall crash summary contains high level crashes, crash rates, and vehicle exposure statistics. The crash type summary contains crashes broken down by accident type. The before period ADT year was 1993, and the after period ADT year was 2000. Please note that Angle crashes were the target crashes for the applied countermeasure.

As shown in Table 1, the naive before and after analysis at the Treatment Intersection resulted in a 19.4 percent decrease in Total Crashes, a 13.9 percent decrease in the Total Crash Rate, a 51.4 percent decrease in the Severity Index, and a 6.3 percent decrease in Average Daily Traffic (ADT). Analysis of the treatment location also resulted in a 30.6 percent decrease in Angle Crashes and a 75.0 percent increase in Rear End Crashes. The Wet Crash Rate increased by 156.0 percent from the before to the after period.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 19.4 percent decrease in Total Crashes and a 30.6 percent decrease in Angle Crashes. The severity index of the treatment intersection also decreased by a substantial amount (51.4%) which is attributed to no class-A injury accidents in the after period.

The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total and Angle Crashes from the before to the after period. The only crash categories that increased from the before to the after period were the number of Wet crashes (140.0%) and Rear-End crashes (75.0%). Please see the attached *Treatment Site Location Photos*. Photos are provided for each leg of the treatment intersection.

The countermeasure crash reduction for Total Crashes at the subject intersection is a 19.4 percent decrease in crashes. The countermeasure crash reduction for Angle Crashes at the subject intersection is a 30.6 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

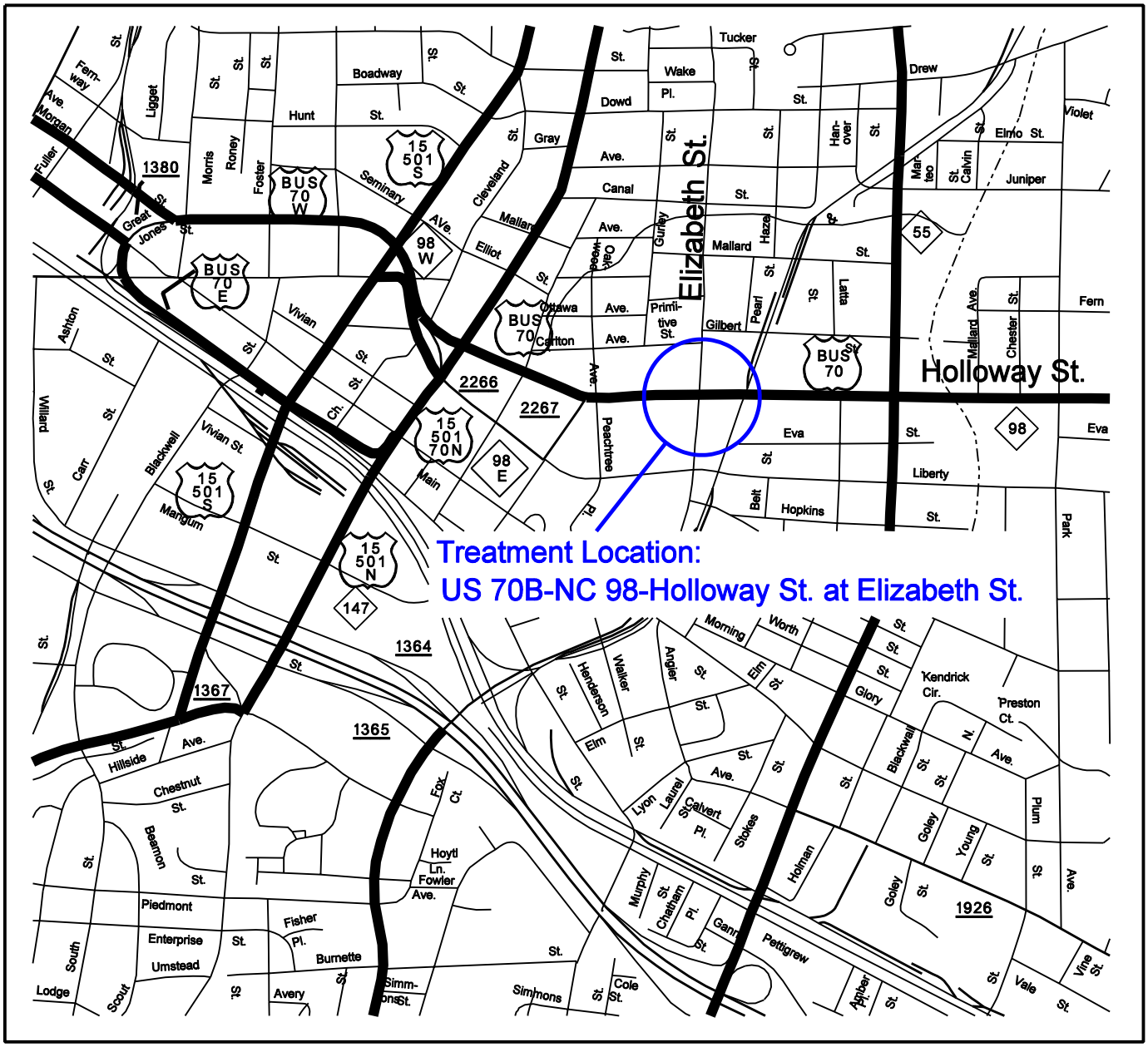
Table 1. Treatment Intersection Overall Crash Summary and Crash Type Summary

OVERALL CRASH SUMMARY	Before Period	After Period	Percent Change
Total Crashes	62	50	-19.4
Fatal Crashes	0	0	n/a
Non-Fatal Injury Crashes	27	18	-33.3
Total Injury Crashes	27	18	-33.3
PDO Crashes	35	32	-8.6
Night Crashes	13	11	-15.4
Wet Crashes	5	12	140.0
Total Crash Rate	227.25	195.56	-13.9
Fatal Crash Rate	0.00	0.00	n/a
Non Fatal Crash Rate	98.96	70.40	-28.9
Night Crash Rate	47.65	43.02	-9.7
Wet Crash Rate	18.33	46.93	156.0
Annual ADT	11200	10500	-6.3
Total Vehicle Exposure	27.28	25.57	-6.3
Severity Index	7.53	3.66	-51.4

CRASH TYPE SUMMARY	Before Period	After Period	Percent Change
Angle	36	25	-30.6
Backing Up	3	2	-33.3
Head On	1	1	0.0
Left Turn - Different Roadways	3	1	-66.7
Left Turn - Same Roadways	2	2	0.0
Parked Motor Vehicle	4	1	-75.0
Pedestrian	2	0	-100.0
Ran Off Road - Right	1	0	-100.0
Rear End, Slow or Stop	8	14	75.0
Right Turn, Different Roadways	1	1	0.0
Right Turn, Same Roadway	1	0	-100.0
Sideswipe, Opposite Direction	0	1	n/a
Sideswipe, Same Direction	0	2	n/a

Location Map, in Durham, Durham County

Evaluation of Spot Safety Project #05-94-065



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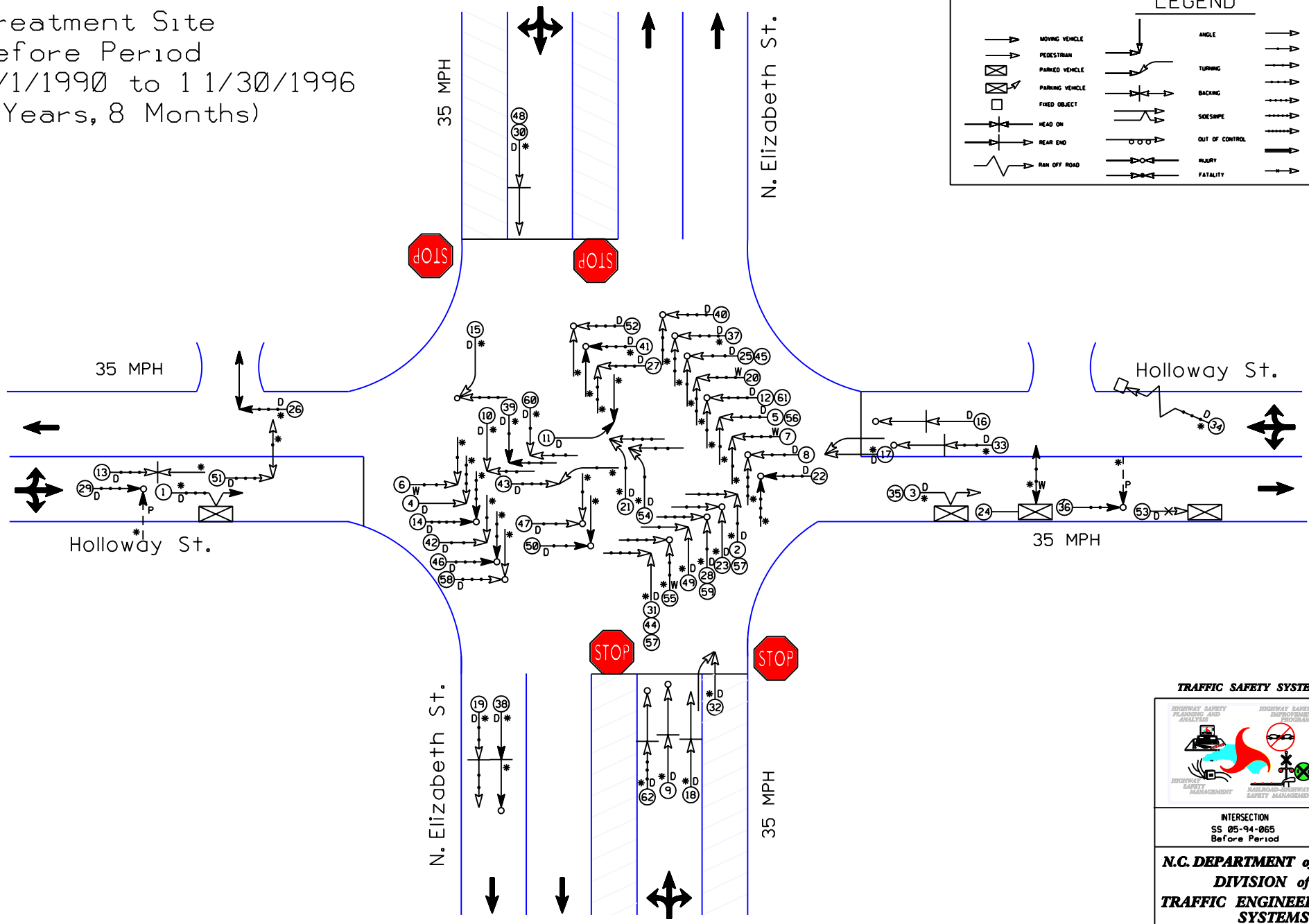
Treatment Site
Before Period
4/1/1990 to 11/30/1996
(6Years, 8 Months)



LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN

P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 4/1/1990 to 11/30/1996	
DISTANCE:	
ANALYSIS PREPARED BY:	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: Hank Schwab	
DIAGRAM REVIEWED BY: Carrie Goodrich	
DIAGRAM REVIEWED BY:	
SCALE:	
DATE: 8/15/2004	
LOG NUMBER: 20040075	

INTERSECTION
SS 05-94-065
Before Period

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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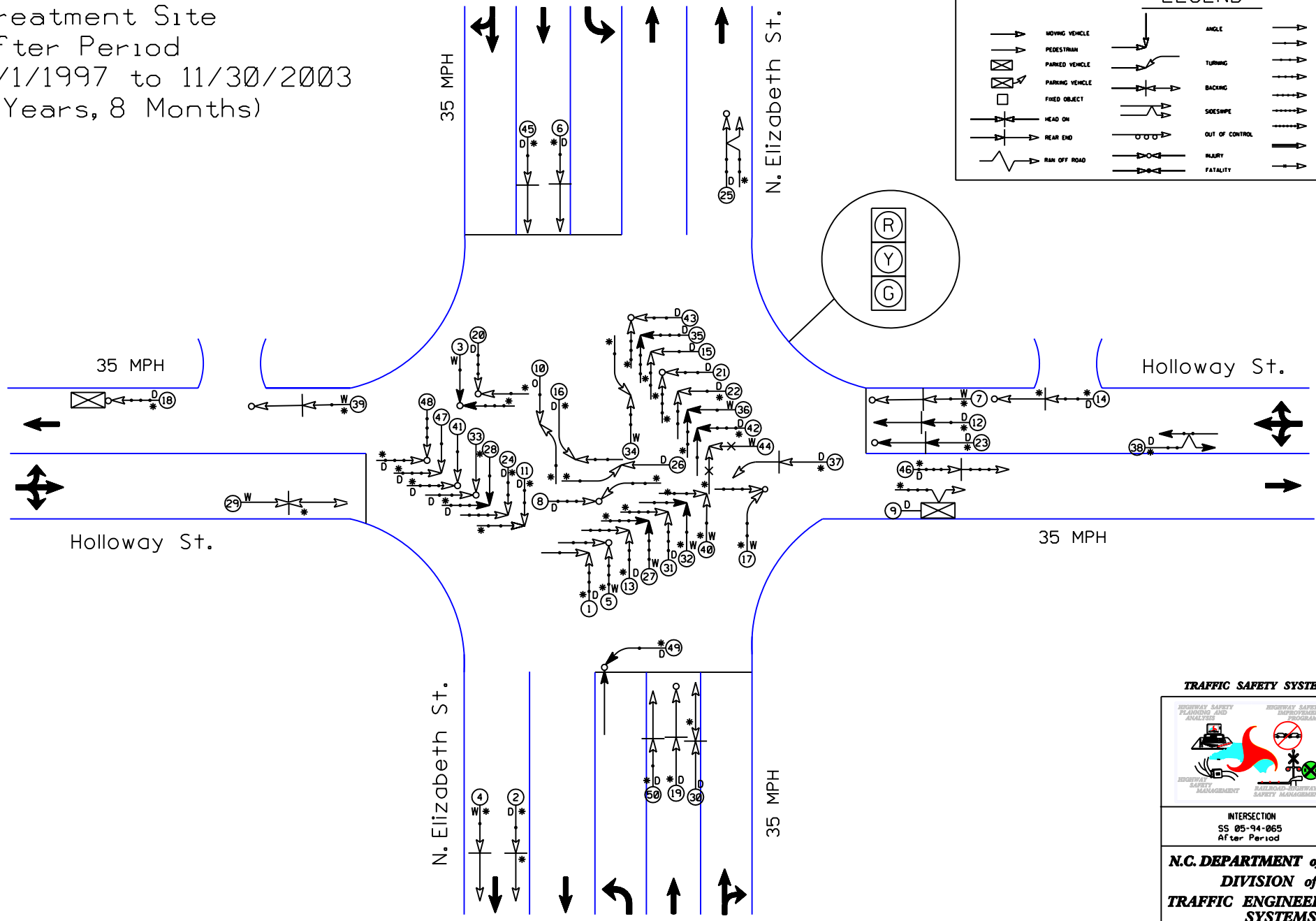
Treatment Site
After Period
4/1/1997 to 11/30/2003
(6Years, 8 Months)



LEGEND

MOVING VEHICLE
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PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
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REAR END
RAN OFF ROAD

ANGLE
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9 MPH OR LESS
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TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM

DIVISION: 5	AREA:
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ANALYSIS PREPARED BY:	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: Hank Schwab	
DIAGRAM REVIEWED BY: Carrie Goodrich	
DIAGRAM REVIEWED BY:	
SCALE:	
DATE: 8/16/2004	
LOG NUMBER: 200408075	

INTERSECTION
SS 05-94-065
After Period

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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